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with Dr. James Compton
(8)

APHASIA AND DEATH RESULTING FROM
SOFTENING IN LEFT ANTERIOR CERE-
BRAL LOBE AND CEREBELLUM, DUE TO
ATHEROMATOUS DEGENERATION AND EM-
BOLISM OF THE CEREBRAL ARTERIES.

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THE following very interesting case appears to corroborate the views recently advanced by certain pathologists as to the cause of loss of power of speech, or of the memory of words; it is also very remarkable as an example of cerebral softening, at a comparatively early age, from atheromatous degeneration of the vessels of the brain, with embolism of the basilar artery. I therefore give the notes I made of it, before and after death, in detail.

I have known Mr. — for several years, and until three years ago his general health was good; he is about 42 years of age, of a nervous, excitable temperament, and of energetic and active habits of mind and body. About three and a half years ago he consulted me concerning one or two sores on the leg, which were of a suspicious character, and which he seemed to consider might owe their peculiarity, if not their origin, to a constitutional taint; if so, the disease must have been contracted in early youth, for he denies the possibility of any infection for many years. His habits and mode of life have been temperate and active, his occupation necessarily exposing him to frequent change of station, with much of his time spent in the open air. I did not attach so much importance to the sores as he did; they readily healed with rest and simple applications. But I prescribed iodide of potassium, with reference to the possible specific origin. In September, 1863, I was

informed that he had been attacked, suddenly, with hemiplegia of the right side, and have since seen the following note :—

“ January 7th, 1866.

“MY DEAR SIR,—Mr.——had a stroke of paralysis in September, 1863, for which I gave him a certificate home. He returned to India in June last very much improved in health, so much so, that I was particularly struck with his strong healthy appearance.

“About a couple of months after his return he suffered for some days with a severe headache, which fixed itself in the back of his head, and though I could get no definite description from him of the nature of the pain, yet I could see from his restlessness, both during night and day, that he suffered a good deal. A few days' rest and quietude within doors and some mild treatment restored him to health to a certain extent, but not to the state he was in when he returned to this country. He went out on a long tour of inspection, and I dare say was not as careful of himself as he should have been ; but a few days after his return, he had a return of the headache; he had great nervous tremor of the hands. His memory (of which there was previously some failing) had now fallen off in a very sudden and marked way ; he used to remain in a half-dreamy, half-drowsy state all the day, sit to meals in this state, and talk as if he had not quite awaked from sleep. He partially recovered from this state, in fact quite enough to set him thinking about his duties, and he, strongly against my advice, left this on a tour in the Orissa country ; he has not yet returned, but his Baboos tell me he will be back about the middle of the month.

“I have now quite made up my mind that he is not fit for further service, but I shall, in the first instance, and that will be so soon as he returns to the station, give him a medical certificate home ; any steps that are necessary for his retiring from the service may very well be left for future consideration.

“Yours, &c., &c., &c.,

“ Civil Surgeon.”

He had, apparently, no warning ; the attack occurred during the day, when he was talking to some one. He appears for a time to have lost all power in the right side, though he retained consciousness, but this paralysis was not of very long duration. He recovered partially, and subsequently regained power in his limbs ; his speech improved, though some thickness, slight difficulty of articulating certain words, and a quick and excited mode of speaking remained. He was most judiciously treated ; no depletion was had recourse to, and his powers were husbanded as much as possible.

In 1864 he went home to England, round the Cape, and on the voyage he appears to have been subjected to much anxiety and excitement from the danger to which the ship was exposed in a gale of wind, which required that she should be taken into port in the Mauritius and there detained for some weeks. It does not appear, however, that he suffered from this exposure ; on the contrary, his health and strength improved with the change, and the improvement was further confirmed during his residence of fifteen months in England. He returned to India in June, 1865, and I saw him soon after his arrival ; he looked well, and all traces of hemiplegia, so far as the limbs were concerned, had passed away. His voice, however, was still slightly affected ; there was an indistinctness in the articulation of certain words ; there was also an unnatural rapidity of utterance. His intellect seemed perfect, and he resumed his appointment. As the hot weather came on, he appears to have begun to fail ; his memory became defective, his manner excited, and his speech more rapid and uncertain. There was a tendency to forget, or to substitute words, and his intellectual powers, naturally great and much developed by scientific and literary study, to show signs of failing.

On one occasion I was asked to see him when he was in Calcutta, and I found his manner excited, his speech quick and somewhat indistinct. His memory was evidently on the strain, and though I could see no absolute indication of the original disease returning, it was evident that some permanent defect remained, which, under the excitement of heat and duty,

was becoming more marked, and indicated that cerebral change (whether dynamical or structural was uncertain) was at work.

23rd March.—A few weeks ago I heard an unfavorable report of him ; there were no details beyond the fact that his memory was altogether gone. On the 8th of April I was asked to see him here ; he had been sent in from ——— on his way home. The accompanying statement of his case was subsequently forwarded by the medical officer who had seen him during his last attack ; and it clearly explains what happened shortly before he came to Calcutta.

DR. ———'S STATEMENT.

"Mr. ———, aged 42 years, has been in India fourteen years.

"On the 23rd March last I was called to attend Mr. ———. On my arrival I found him insensible, with a small pulse, pupils dilated, breathing easy, at times muttering to himself the most absurd nonsense ; his breath was extremely foetid. No paralysis, but slight convulsive movements of the right side of the body. His servants informed me that Mr. ——— had been accustomed to fits of drowsiness, and on one occasion, I am told, he slept for three days. I was further informed that his bowels were not moved for three or four days.

"The Sub-Assistant Surgeon, who was called in before my arrival, had cut off his hair and applied cold. We then gave Mr. ——— an injection of ol. ricini and turpentine, which acted once ; he was further given a couple of calomel and colocynth pills with croton oil, and mustard plasters applied to the nape of the neck. Next morning he had a strong dose of senna mixture ; this produced one very copious evacuation.

"During the day I found him better, *i. e.*, he was able to walk ; he could not recognise people at once, but did so after an effort. On questioning him he gave a reply, but it was all nonsense ; he improved a little, and on the 5th April I sent him to Calcutta.

"I treated him principally with purgatives ; every blister failed, partly from his obstinacy, partly from their uncertainty of action. I also gave him small doses of mercury, partly as a

purgative and partly to affect his system ; this last did not occur. I made him pass his urine daily in my presence, to satisfy myself as to the state of his bladder ; the urine was thick and very ammoniacal in smell. All this time I kept him up with light nourishing food. When he left me he was able to walk ; he had an appetite, could recognise people, and could answer questions very rationally ; but if he attempted to carry on conversation he was lost ; it was quite apparent his memory was affected.

“ Of his previous history I know nothing. I am told he suffered from an attack of apoplexy and subsequent paralysis. There are marks near his joint as if he had been bled. I am fully convinced and am of opinion that Mr.—’s brain is most seriously affected, and I am further of opinion that this present attack is a continuation and result of his previous attack of apoplexy or paralysis. Under these circumstances, I now beg to recommend him for leave of absence for eighteen months, to go to England.”

I found him looking remarkably well, as to physical health, stouter and stronger than I have ever seen him. The right hand grasped as powerfully as the left ; the legs were equally strong. The tongue was protruded perhaps a little to the right side, but the cheeks, lips, and eyelids were all perfectly natural. The voice not thicker than before ; the words articulate, but the speech altogether incoherent. The expression of countenance and the pupils natural ; no look of fatuity, insanity, or imbecility ; he at once knew and seemed pleased to see me. He was accompanied by a nurse, who says that he eats and sleeps well, and that he is perfectly quiet, tranquil, and easily managed. Indeed, but for his shaven head and incoherent speech, it would be difficult at first sight to believe that he is so ill as he really is. His condition is indeed one of great urgency, and there is reason to fear that some structural change, degeneration, or softening in the cerebral lobes is taking place. The prominent symptom at present is loss of memory of words—“Aphasia” as it has been designated by

Trousseau and other pathologists. It is difficult to say how far the intellect is affected ; but certainly the main difficulty manifested is the utter inability to give utterance to more than the first few words of a sentence. He seems perfectly to comprehend any question that may be put to him, and makes an attempt to reply ; but the first three or four words have barely found utterance before he lapses into the most incoherent and purposeless jargon, which appears to indicate that the memory of words is not only lost, but that ideas in the wildest and most incoherent jumble supervene on the forgotten sounds.

During the recent very hot weather he has shown some restlessness and impatience of control, wanting to go out and refusing to remain in his room. But he is easily persuaded, and with me he is cheerful and gentle in the extreme ; indeed, were one only to see him, and hear only his reply to such a question as "How have you slept ?" or "How do you feel to-day ?" it would be difficult to believe that anything was the matter.

He takes a walk or a drive with a friend every evening.

His attempts at writing are as incoherent as his speech ; and a note I received the other day was barely legible or intelligible.

His appetite is good and his secretions are tolerably natural. A tendency to constipation is obviated by a croton pill, and cold to the head seems to be grateful and soothing. His pulse is natural and his digestive organs in tolerable order. The tongue has a tendency to be coated, and the breath to be offensive, but the aperient removes or, at all events, improves these conditions.

The nurse says that he occasionally wets his bed, and once or twice he appears to have forgotten where he was emptying his bowels ; but there is neither incontinence of urine nor *fæces*. A cold bath, the douche or shower-bath is given every morning, and this, with cold to the head, quiet, the removal of any cause of excitement, (mental or physical), and a regulated diet is all the treatment that has been adopted since he came here. There can be no doubt that the heat aggravates his condition ; he is more incoherent and more restless under its influence, and less patient of control. I cannot help fearing, though I do not feel certain, that this is more than mere functional disorder, and that

such changes as have been described by M. Bouillaud, Trousseau, Dax, Hughlings Jackson, Saunders, and others, are taking place in the anterior cerebral lobes, and that these changes are the continuation and results of the cerebral disorder that was manifested three years ago in a transient attack of hemiplegia. Without in any way insisting on the connection between the conditions, in the relation of cause and effect, it is right to bear in mind the possible connection that the suspicious patches of ulceration formerly alluded to may have with the pathological condition of which the symptoms described are the manifestations. It is possible that the symptoms may be the result of merely functional disorder, but the previous history is opposed to the theory.

April 30th.—He has been doing well, much as I have reported, until last night. The nurse reports that at midnight he was sick; that he became more peculiar in his manner; passed urine in bed; was more incoherent and seemed to have more restless or irregular movements of the limbs; was quite conscious, and answered all questions as usual. I find him in the morning with a peculiar expression of countenance, the eyes partially closed, his body and limbs partially curled up in bed. His head was cool, pulse quick, tongue clean, bowels confined. Ordered an enema. He had had a pill at bed-time. I observed that the right arm was more rigid than the left, and that he used the left most; he could grasp firmly with the right, but he could not control the movements, and when he wanted to move it, he had to drag or lift it with the other hand. He was cheerful as usual, laughing and trying to joke, but unable to remember his words. I ordered ice to the head, rest, quiet, and a purgative.

Vespere.—The same condition; the nurse thought perhaps a little better; but I observed that rigidity and loss of control, not of power, was greater. He was quite conscious; said he felt the right arm was not right; but in a moment was more incoherent than ever, not remembering the whole of a word. The leg is not affected, the pupils are natural, and the pulse is slow and regular. Voice is natural, that is to say, no signs of paralysis, so far as it is concerned.

Ordered—A croton pill, blister to the scalp, and plain but nourishing diet.

May 1st.—He is no better; the bowels were moved freely, and the enema acted. He has had a restless night; has passed urine in the bed, and when he speaks is quite incoherent. I find him looking much the same. Right arm and fore-arm more rigid, but the wrist flexible; he cannot use it freely, aiding its motion with the other hand. The right leg is also feeble, and towards the afternoon it became more so. He understands all that is said, and answers in a peculiar half-sleepy and incoherent tone. He keeps his eyes half-closed, and the eyebrows contracted; the pupils are natural. His face looks less intelligent, heavy, dull, and oppressed. The blister on the scalp has risen. Pulse varies from 60 to 65; it rises with any exertion. Temperature of body natural. I directed nourishment—beef tea—to be given frequently; and the enema and pill if the bowels do not act again. Cold to the head; blister to be kept open.

His brother said that about noon he appeared to become more conscious, and became much affected, saying it would soon be all over. I expressed my fears to-day that he could not last much longer.

2nd.—No improvement; the arm and leg are still rigid. He quite understands what is said and tries to give an answer. Bowels have been freely moved; has taken nourishment. Keep the blister open; cold to the head. Repeat the enema in the evening, and give another pill if the bowels are not freely moved. Eyes closed, but opens them when told. He replies in a few incoherent half-formed words to what is said, but it is difficult to make out how far he is conscious. The head is cool; pulse 60; skin natural in feeling and temperature.

3rd.—This morning I find him changed, and the change appears to have commenced about 9 p.m. yesterday. He is lying in the most profound sleep, snoring occasionally. The limbs are certainly more relaxed than they were, and the rigidity in the right arm is diminished. His mouth is closed, and he has taken no food. The enema operated freely. Pulse 60;

skin cool ; thermometer 98° in axilla ; pupils natural—if anything, slightly contracted ; but they respond freely to light. He is quite quiet, and has not spoken. He opens his eyes partially ; makes a feeble effort to protrude the tongue when spoken to, which shows that he is still partially conscious.

Ordered—Beef tea enemata ; food by mouth, if he can open it. Keep the blister open ; ice also to head.

Vespere.—I find no change ; he is as he was in the morning. The urine is passed in bed.

4th.—He is no better ; much in the same condition ; more comatose, if anything, but still appears to recognize the voice, for he opens his eyes when told to do so, though he makes no other sign. Enema and nutrient enemata return as given. No food has been given by mouth, for he cannot swallow. Face congested. Pulse 112, feeble.

5th.—He is much the same, if anything, weaker. Pulse 112 ; urine passed freely ; bowels have not acted.

Ordered—Calomel gr. x
 Elaterium „ $\frac{1}{4}$
 in butter,

There is rather less stertor ; pupils act freely ; opens his eyes when asked to do so ; draws up the legs when they are pinched.

6th.—Bowels have acted ; blister risen ; he is much in the same condition ; coma perhaps less profound ; pupils act freely ; he opens his eyes when spoken to. It is very difficult to get his mouth open, and any attempt at swallowing seems to cause spasm.

Repeat calomel and elaterium ; nourishment as before by enemata. Beef tea and Brandy ; food by mouth when possible.

7th.—Much in the same state ; skin hot in afternoon ; pulse quicker ; less stertor ; has taken some broth with great difficulty ; does not seem so conscious as he was ; hardly opens his eyes when told to do so. Let him have iodid : potass : gr. v. every three hours ; nourishment as usual. His pupils are perfectly sentient.

8th.—Much the same ; pulse 120, rapid and feeble ; pupils still quite sentient ; involuntary discharge from bowels.

9th.—Weaker ; symptoms the same ; a sort of catch in inspiration ; pulse 140 to 160 ; involuntary discharges. Death at 5-30 p.m.

POST MORTEM EXAMINATION (13 hours after death.)

The body was well nourished. The head, which was remarkably well formed, had been shaven, and marks of vesication existed on the scalp.

Head.—On opening the cranium, a small quantity of opaque fluid was seen lying under the dura mater ; underneath the situation of the blister, the vessels of the dura mater and corresponding bone were somewhat congested. On removing the brain from its attachments, opaque, but not inflammatory, exudation was observed in excess about the fissures of Sylvius and generally in the subarachnoid space. When the dura mater was completely removed, and the brain turned with its inferior surface upwards, the whole of the inferior surface of the left anterior lobe of the organ appeared shrunken and smaller than that of the opposite hemisphere. There was also noticed matting together of the convolutions on each margin of the fissure of Sylvius on the left side. Just on the antero-lateral aspect of the left corpus striatum in the nerve matter, intervening between that ganglion and the convolutions, there was a portion of yellowish and softened brain, from which, when cut into, a small quantity of opaque serous fluid escaped. The size of the cavity remaining after the fluid flowed away was about that of a pea ; and this, in all probability, represented the centre of the mischief which produced the hemiplegia, and interference with the faculty of speech three years ago. But now there was observed somewhat extensive white softening all round this spot, affecting the convolutions on the one hand, and the anterior portion of the corpus striatum on the other. The softened brain here contained granules, broken down nerve tubules, and nerve vesicles, but it was mainly composed of fat globules of variable size.

On the left and inferior aspect of the pons varolii, a portion of white softening, as large as a hazel nut, existed. The nerve structures were so altered in consistency that on pouring water on the part, the softened material was washed away, exposing a breach which penetrated the transverse or commissural fibres, the upward fibres from the corpus pyramidal, and the vesicular continuation of the olivary ganglion. But the whole structure of the pons—the medulla oblongata and crura cerebelli—was softer than natural.

The disorganized nerve substance of the pons was found to be constituted of a great quantity of granular matter, a few stray tubes and vesicles undergoing disintegration, and abundance of fat globules of different sizes. Neither in this nor in the softened part of the left anterior lobe could a single exudation corpuscle be seen.

The arterial circulation was examined with care. The vertebrals and basilar were thickened, rigid, and of a yellowish opaque colour from atheromatous or fatty degeneration. At the commencement of the basilar, the thickening of the vessel was so remarkable as to narrow its calibre most materially. It felt hard, like a piece of cord to the touch; on laying it open here, its internal lining was opaque and roughened, having lost its brilliancy and smoothness. Immediately on the distal aspect of the atheroma, a dark-coloured clot of recent standing was seen completely blocking up the artery, and thus cutting off the normal supply of blood to the cerebellum, pons, and the posterior lobes of the brain on both sides, until a supplemental supply could be furnished by the internal carotid arteries, through the anastomotic system of the circle of Willis.

The whole of the primary and secondary arteries of the cerebrum and cerebellum were more or less spotted with a yellowish coloured atheromatous material. It was most characteristically developed, however, in the vessels on the left side of the brain.

The heart was flabby, aortic valves healthy; but the ascending aorta, the curtains of the mitral valves, the innominate,

left subclavian, and carotid all contain atheromatous material.

For the above description of the post-mortem appearances I am indebted to Dr. Joseph Ewart, Professor of Physiology, and Pathologist to the Medical College. He and Professor Partridge, who saw the case with me, were good enough to assist me in conducting the examination.

REMARKS.

This case is one of great interest and importance. I have not been able to ascertain that there was any hereditary tendency to disease, either of the vascular or nervous systems; and the history of the patient, previous to the attack of hemiplegia, three years ago, tells only of a sound mind in a sound body. His mental and physical vigor were both remarkable, and although he was always of an excitable and vivacious disposition, there was nothing in the least suggestive of any organic or structural disease.

On hearing of the attack of hemiplegia three years ago, and learning that it was not in any way connected with recent exposure to the sun or to great heat, I was at a loss to account for it, and my thoughts reverted to the ulceration of doubtful origin as suggestive of a constitutional cause. I also thought of embolism, but not having the least idea that he was the subject of any vascular unsoundness, was equally unable to account for it on those grounds. I happened to know that the cardiac sounds were natural, and that he was free from any indications of valvular or other form of heart disease.

That a small vessel had given way, and temporary hemiplegia resulted from the pressure of a small clot in or near the left corpus striatum, was the last conclusion at which I arrived, and the subsequent history, up to his return to duty, appeared to support that conjecture.

The post-mortem examination proved that it was even more than that. The universally diseased condition of the arterial system, and the extent to which it had proceeded in the cerebral vessels, fully account for all, not only the past, but the recent symptoms.

The arteries of the brain—especially of the left side, and more especially those of the posterior part of the encephalon—the vertebrals and the basilar were diseased to a degree that I have never before seen. The vessels of the left side were unusually thickened and irregular from atheromatous deposit, and the basilar itself was completely plugged with a colored but firm clot. This, no doubt, was of very recent origin, and dated about the period when he passed into a state of almost perfect insensibility some days before his death.

The gradually progressive disease of the vessels had, no doubt, so far interfered with the circulation generally, through the left side of the brain, as to induce the gradually increasing symptoms of cerebral softening to which his history points as having been present, and the probability is that other and smaller embolisms have, like that of the last attack, formed from time to time, and compromised the nutrition of the brain, though not occurring in the vicinity of, or where they immediately affected, the cerebral ganglia. The effects were not so striking as in the first case, where either a hæmorrhage or an embolism directly affected the left corpus striatum.

The cause of embolism, no doubt, lay in the roughened coats of the diseased arteries. As the atheromatous degeneration gradually increased, disorganizing the smooth epithelial lining of the tube, the blood could hardly flow over it without leaving fibrous deposits or coagula, which in their turn, being washed away by the current, were carried into smaller channels which they plugged, and thus the blood itself became the source of the mischief. The recent large embolism in the basilar artery—the result of contact with the roughened and diseased vertebrals—is only an example, on a larger scale, of what probably occurred years ago in a smaller vessel of the anterior lobe, and no doubt often, more recently, in the cerebral circulation generally, until finally the starvation of the medulla oblongata precipitated the fatal event. It is interesting, in reference to the observations of the distinguished pathologists whose names I have already mentioned, to note that the lesion in the first place seemed to fall on the left anterior lobe, and that

certainly a marked feature in his case throughout, was affection of the speech; for even after the first attack, though perfectly recovered in all other respects, there remained some peculiarity in his speech—a rapidity of utterance, and a tendency to forget or to substitute words that was quite unnatural. As the wasting of the brain substance proceeded, this condition of *aphasia* also tended to increase, until just before the occurrence of the last fatal embolism of the basilar artery it had become the most marked feature of his condition, and pointed to what we had feared must prove to be irreparable mischief in the brain.

The arterial disease must, no doubt, therefore be regarded as the cause of mischief; it is remarkable that it should have gone to such an extent at the comparatively early age of 42.

The aorta was literally one mass of atheroma. There was more diseased than sound tissue, and it is probable that the same condition existed throughout the body, although no local gangrenes had occurred to give evidence that it was so. In all other respects he was in remarkably good health, being fatter and more muscular than I had ever seen him, within a fortnight of his death. His organs generally were sound; lungs, liver, spleen, and kidneys performed their functions naturally; the heart's action was normal in rhythm and sound; and his pulse was steady and regular. The atheromatous degeneration of the arterial system appears to have been a constitutional peculiarity, and to it must be assigned the disturbance in the circulation which resulted in the pathological conditions I have described.

